Potential Synergy of White-tailed Deer and Invasive Plants for Impacting Forest Plant Diversity

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Major Problems in Eastern Forests

- High densities of white-tailed deer over browse native vegetation, preventing regeneration

- Invasive species often out compete native vegetation, keeping native species suppressed

The Problem

- White-tailed deer prefer browsing native vegetation rather than exotic and invasive species, so native plant species not only have to compete with invasive species, they have to survive herbivory by deer. It is unknown if these two factors are additive or compensatory.

Common Invasive Species

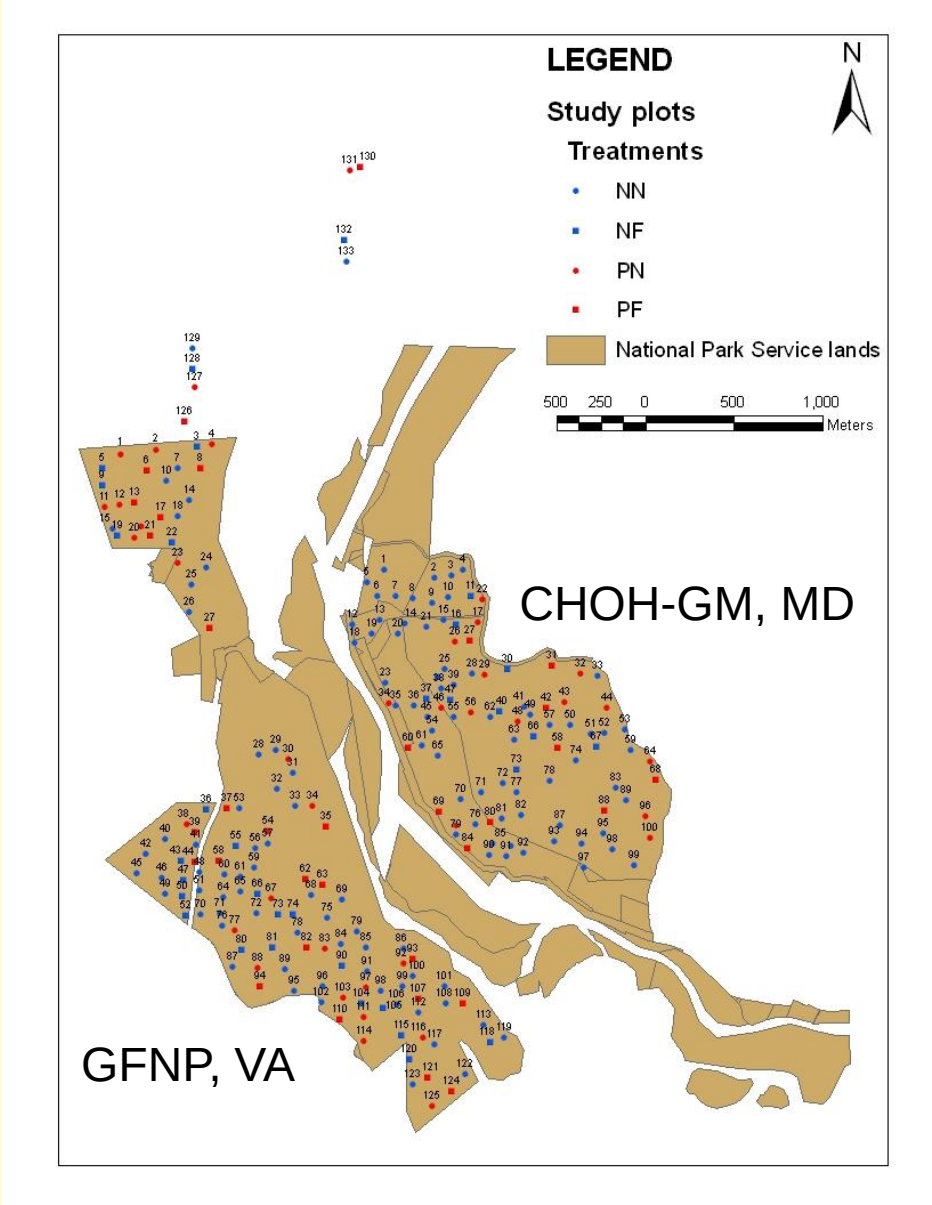
- Japanese stiltgrass (*Microstegium vimineum*)
- Garlic mustard (*Alliaria petiolata*)
- Mile-a-minute (*Polygonum perfoliatum*)



Study Areas

- Great Falls National Park (GFNP), and C&O Canal National Historical Park – Goldmine tract (CHOH - GM)

- 30-42 deer/km^2 2003-2006



The Proposed Solution:

- Management for native species may need to include controlling both deer densities and invasive species.

Experimental Design

- 233 total plots randomly established in upland deciduous forest for monitoring of invasive species and deer herbivory

- 68 4x4 meter exclosures built in 2 parks
  - 48 at GFNP 20 at CHOH-GM

- 73 plots had all invasive species removed (via hand pulling) from the plot and surrounding buffer area
- - 48 at GFNP 25 at CHOH-GM

Project Details

- All plots inventoried prior to treatment to get baseline plant community data

- **2 x 2 factorial design:**

  - Some plots left unmanipulated as controls (NN)

  - Some plots fenced to exclude deer (NF)

  - Some plots had invasive species removed by hand pulling (PN)

  - Some plots received both treatments (PF)

Project Details (Continued)

- We can determine whether plants gain a competitive advantage by removing one of the suppressive agents (deer or invasives), or if both need to be controlled for a native vegetation response
- All native non-woody plant species, and native woody plants ≤ 30cm high, analyzed here
- Calculated species richness, species diversity (Shannon index, *H'*), and number of woody stems per plot in 2005 and 2007

Summer 2006: Remove Invasives

Initial Results

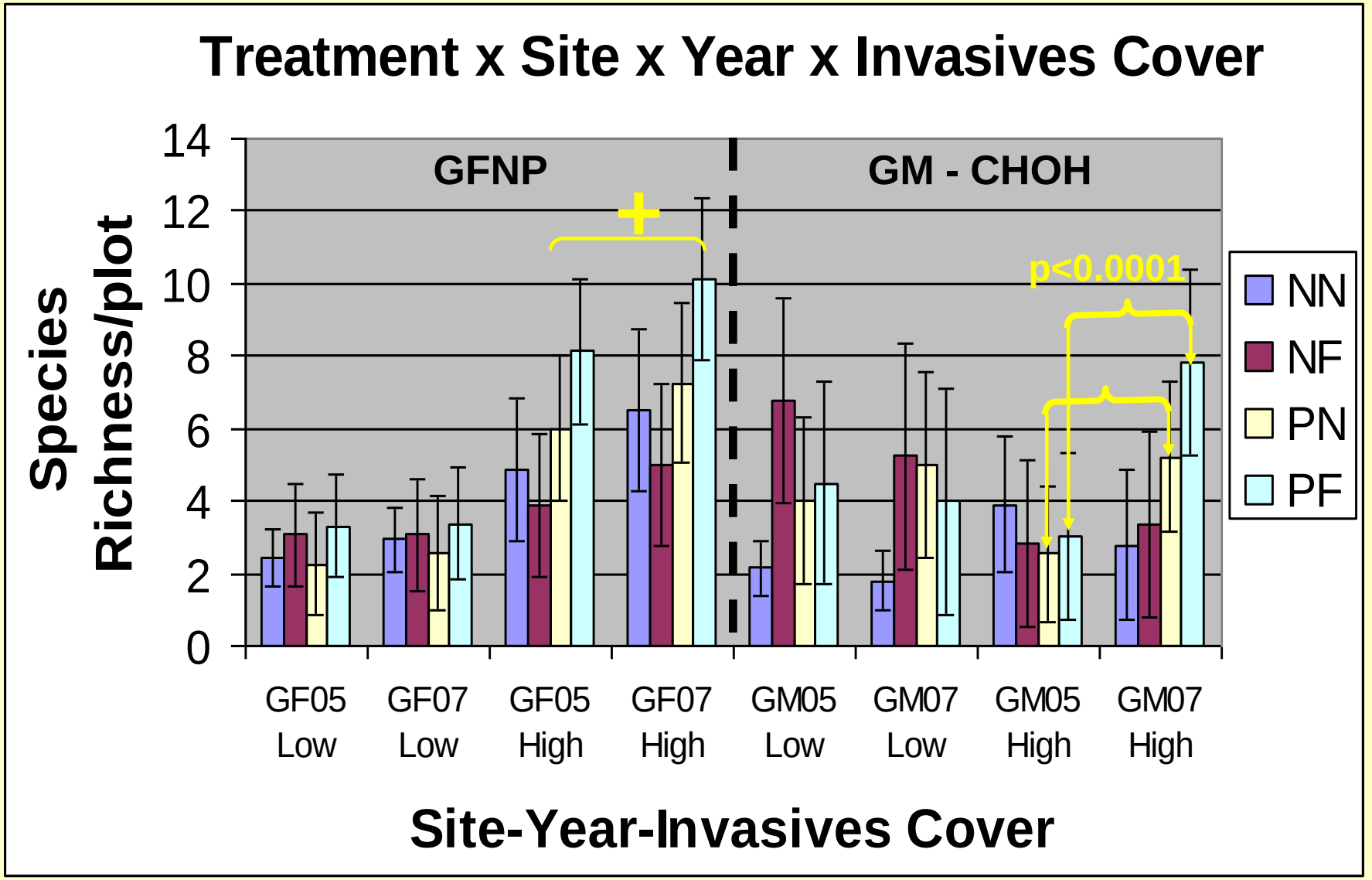
- Increase in total species recorded at both sites from 2005 to 2007

  - 164 to 169 at GFNP 113 to 128 at CHOH

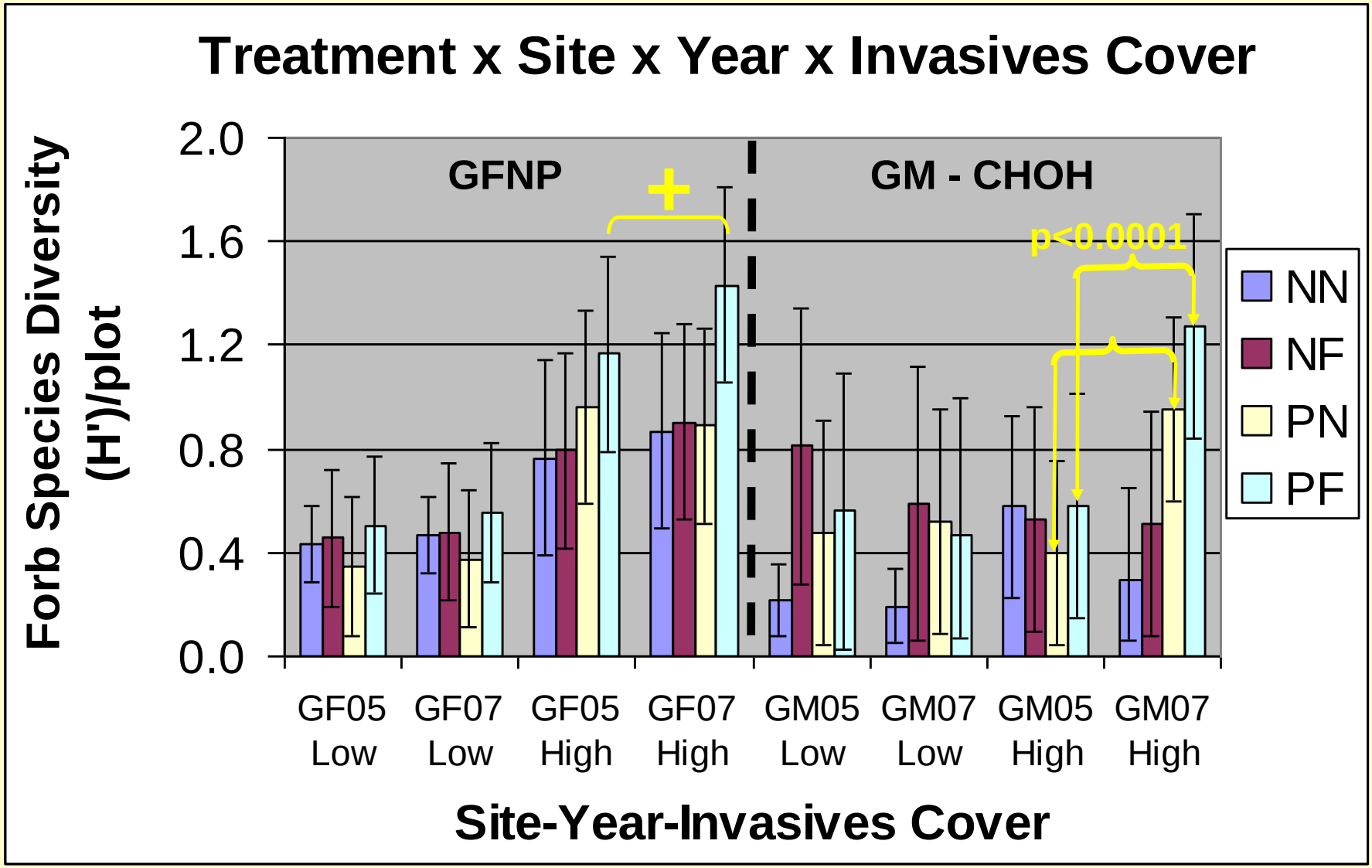
- Non-woody species responsible for the significant changes

- Woody species showed increasing trends but not significant treatment effects by 2007, as predicted

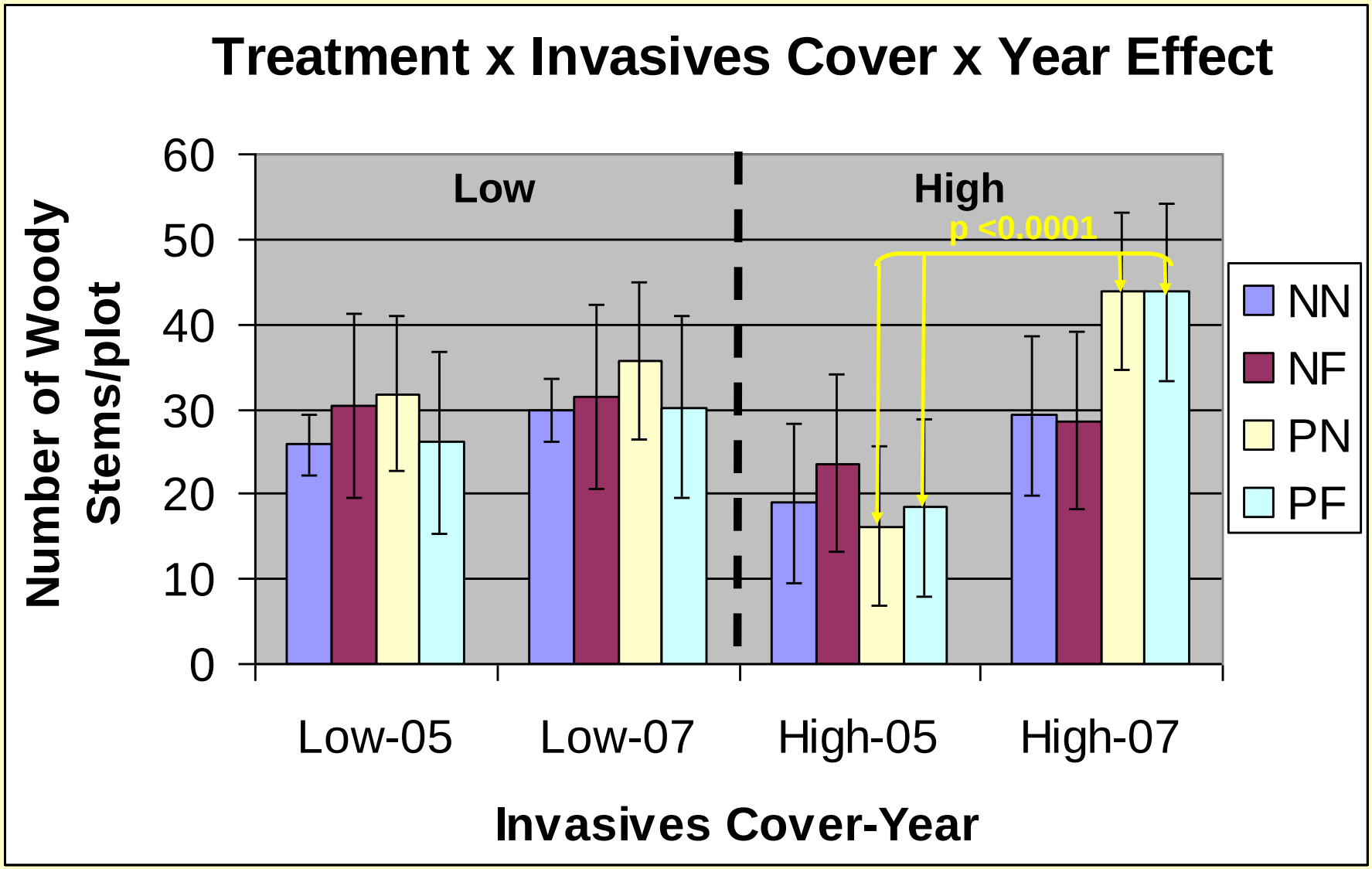
Herbaceous Species Richness



Native Forb Species Diversity



Number of Woody Stems



Implications

- Results for non-woody native plants, particularly the increases in the PN treatment, show that invasive plant cover negatively impacts them and that collateral damage did not occur

- Similar response in the PN and PF treatments indicates the primary inhibitor for most non-woody natives is the presence of invasive plants and not deer herbivory

- Deer management, such as fenced exclusion or population reduction, in the absence of invasive plant removal, may therefore be insufficient to promote restoration of the native plant community

- Detection of significant treatment effects on woody species may occur after more time, although positive trends were seen thus far

Future Plans

- Maintain fences and continue pulling treatments through winter of 2009
- Re-inventory all plots in summer of 2009

Acknowledgments

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